

## **REMARKS**

The final Office Action mailed December 28, 2005, has been received and reviewed.

Claims 1-7, 9-14, and 18-24 are currently pending and under consideration in the above-referenced application. Of these, claims 7 and 9-12 have been allowed, claims 5, 14, 20, and 22 recite allowable subject matter, and claims 1-4, 6, 8, 13, 18, 19, 21, 23, and 24 stand rejected.

Reconsideration of the above-referenced application is respectfully requested.

## **Supplemental Information Disclosure Statement**

Please note that a Supplemental Information Disclosure Statement was filed in the above-referenced application on March 11, 2005, but that the undersigned attorney has not yet received any indication that the art cited in the Supplemental Information Disclosure Statement has been considered in the above-referenced application. It is respectfully requested that the art cited in the Supplemental Information Disclosure Statement of March 11, 2005, be considered and made of record in the above-referenced application and that an initialed copy of the Form PTO/SB/08 that accompanied that Supplemental Information Disclosure Statement be returned to the undersigned attorney as evidence of such consideration.

## **Amendment to the Specification**

The CROSS-REFERENCE TO RELATED APPLICATION section of the specification of the above-referenced application has been has been amended to update the status of the parent of the above-referenced application.

## **Claim Objections**

Claim 22 has been objected to due to informalities in the claim language. These informalities have been addressed. Accordingly, withdrawal of the objection to claim 22 is respectfully requested.

### **Double Patenting Rejection under 35 U.S.C. § 101**

Claim 8 stands rejected under 35 U.S.C. § 101 for reciting the same subject matter as that to which claims 5-12 of prior U.S. Patent 6,322,634 (hereinafter “the ‘634 Patent”) are drawn.

It is respectfully noted that claim 8 was previously canceled in the Amendment under 37 C.F.R. § 1.116 of March 11, 2005. M.P.E.P. § 1207.04 states that after reopening prosecution after appeal, “[a]ny after final amendment or affidavit or other evidence that was not entered before must be entered and considered on the merits.”

Therefore, the cancellation of claim 8 renders the double patenting rejection moot.

### **Rejections under 35 U.S.C. § 102**

Claims 1-4, 6, 13, 18, 19, 21, 23 and 24 stand rejected under 35 U.S.C. § 102(b).

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

#### Morita or Mandelman

Claims 1-4, 6, 13, 18, 19, 21, 23, and 24 stand rejected under 35 U.S.C. § 102(b) for reciting subject matter which is purportedly anticipated by that described in either U.S. Patent 5,506,168 to Morita et al. (hereinafter “Morita”) or U.S. Patent 5,521,422 to Mandelman et al. (hereinafter “Mandelman”).

Independent claim 1 recites a structure that includes at least one shallow trench isolation structure with a substantially flat surface and an integral ledge that contacts an area of the active surface of a semiconductor substrate of the structure located adjacent to a trench within which the shallow trench isolation structure is at least partially located. There is no discernable boundary between the integral ledge and a remainder of the shallow trench isolation structure.

Independent claim 13 is drawn to an intermediate semiconductor device structure that includes a semiconductor substrate with at least one trench formed therein, and a trench isolation

structure within the at least one trench. The trench isolation structure also extends laterally over at least one trench corner and contacts a portion of the active surface of the semiconductor substrate adjacent to a trench corner.

Independent claim 18 is directed to a precursor to a semiconductor device structure. The precursor of independent claim 18 includes a semiconductor substrate, at least one trench formed in the semiconductor substrate, and a buffer film layer over an active surface of the semiconductor substrate. In addition, the at least one shallow trench isolation structure includes at least one integral ledge that extends laterally outward from the at least one trench so as to contact an area of the active surface adjacent the at least one trench.

It is respectfully submitted, that neither Mandelman nor Morita expressly or inherently describes a trench isolation structure that extends laterally over a trench corner and contacts an area of the active surface of a semiconductor substrate.

Morita discloses structures that the Office has asserted include trench isolation structures 3(37)/11 that assertedly lack discernable boundaries and that contact the active surfaces of semiconductor substrates 1. Office Action, page 4. These structures appear in FIGs. 66, 67, 72, and 73 of Morita.

The structures upon which the Office bases its rejections include a substrate 1 with a trench formed therein, a silicon oxide film 11 lining the active surface and the trench surfaces of the substrate 1, and a silicon nitride film 37 within the trench. It is noted in the outstanding Office Action that there is no confusion on the part of the Office that the silicon oxide film 11 is a part of the trench isolation structure 3(37). Office Action, page 4. As the silicon oxide film 11 and the trench isolation structure 3(37) of Morita are separate structures and, as FIGs. 67 and 73 of Morita clearly depict, the silicon oxide film 11 is disposed between portions of the trench isolation structure 3(37) that extend over the active surface of the substrate 1, the silicon oxide film 11 of the structures depicted in Morita clearly prevents the trench isolation structure 3 from contacting the active surface of the substrate 1.

Each of independent claims 1, 13, and 18, by its plain language, requires that a trench isolation structure contact an active surface of a semiconductor substrate. As Morita lacks any

express or inherent description that the trench isolation structure 3(37) thereof contacts the active surface of a substrate 1, Morita does not anticipate each and every element of any of independent claims 1, 13, or 18. Therefore, under 35 U.S.C. § 102(b), the subject matter to which each of these claims is directed is allowable over the subject matter disclosed in Morita.

Mandelman describes (at col. 5, lines 3-23) and illustrates (in FIG. 4c) a precursor to a semiconductor device structure that includes a semiconductor substrate 10 with trenches 16 formed therein. The trenches 16 of the semiconductor substrate 10 are lined with a thermal oxide 34, as are areas of the active surface of the semiconductor substrate 10 that are located adjacent to the trenches 16. STI structures 18 fill the remaining space within the trenches, and include corner dielectrics 22c that extend laterally over regions of the active surface of the semiconductor substrate 10 that are located adjacent to the trenches 16. The STI structures 18a and their corner dielectrics 22c contact the thermal oxide 34 that lines the trenches 16 and regions of the active surface of the semiconductor substrate 10 that are adjacent to the trenches 16. The thermal oxide 34 prevents the STI structures 18a and their corner dielectrics 22c from contacting any portion of the active surface of the semiconductor substrate 10.

It has been asserted that Mandelman “discloses in the process step between the intermediate products of figures of 4a and 4b trench isolation structure contacting the surface of the active surface.” Office Action, page 3. A closer look at FIGs. 4a and 4b of Mandelman will reveal, however, that the active surface of the silicon substrate 10 is covered by the thermal oxide layer 34, thus preventing the contact of element 22c with the active surface of the substrate 10.

Pad oxide 11 of the structure described in Mandelman may not properly be categorized as a part of either the silicon substrate 10 or an insulator 18a, which fills a trench 16 in a silicon substrate 10. This is because Mandelman clearly describes the pad oxide 11 as being formed on the silicon substrate 10 before the trench 16 is formed in the silicon substrate 10 and, thus, before insulator 18 is introduced into the trench. Col. 3, lines 55-65. As FIG. 4c of Mandelman shows that the pad oxide 11 remains in place between the active surface of the silicon substrate 10 and the insulator 18a once insulator 18a is patterned from insulator 18, it is clear that pad oxide 11

prevents any portion of insulator 18a that extends over the active surface of the silicon substrate 10 from contacting the active surface.

Since Mandelman does not expressly or inherently describe a structure in which a portion of a trench isolation structure that extends over the active surface of a semiconductor substrate contacts the active surface, Mandelman does not anticipate each and every element of any of independent claims 1, 13, or 18, as would be required to maintain the 35 U.S.C. § 102(b) rejections of these claims.

Each of claims 2-4, 6, 19, 21, 23, and 24 is allowable, among other reasons, for depending either directly or indirectly from independent claim 1, independent claim 13, or independent claim 18, each of which is allowable.

Withdrawal of the 35 U.S.C. § 102(b) rejections of claims 1-4, 6, 13, 18, 19, 21, 23, and 24 is respectfully solicited.

#### **Allowable Subject Matter**

The allowance of claims 7 and 9-12 and the indication that claims 5, 14, 20, and 22 are directed to allowable subject matter are gratefully acknowledged. None of claims 5, 14, 20, or 22 has been amended to independent form, as the claims from which they depend are believed to be separately allowable.

#### **Entry of Amendments**

Entry of the proposed amendment to claim 22 is respectfully requested, as revision of the claim removes an issue from the above-referenced application. Additionally, entry of the proposed change to claim 22 would not introduce new matter into the above-referenced application or necessitate another search.

In the event that a decision is made not to enter the proposed claim amendments, entry thereof upon the filing of a Notice of Appeal in the above-referenced application is respectfully requested.

### CONCLUSION

It is respectfully submitted that each of claims 1-7, 9-14, and 18-24 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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Date: February 27, 2006

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